Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

information relating to all occupational diseases, the cause of syphilis and gonorrhea, in addition to enlightenment concerning other infections; with these as some of the duties which ought to devolve upon health boards, we have here a job requiring a high degree of intelligence and learning which must be paid well. Failure to provide ourselves with such skill spells niggardliness.

Fourth. Were I eminently qualified for the position which you offer me under the statute, I could not, situated as I am, at my time of life, afford to give the time which it should require. No one has ever presented one logical reason why men whose duty it is to conserve the health of our citizens should devote their best efforts to that gigantic and most important task without remuneration.

So long as the State is content to fill these vital positions with unpaid men, just so long will these men be obliged to render a service commensurate with what they receive.

It would be equally deplorable, of course, were these offices used for the payment of political debts.

Having thus stated my reasons for declining what ought to be an honor, may I add, in conclusion, that preventive medicine in Maine is a farce by comparison with the work done in such States as Massachusetts and New York. It is a blot on our escutcheon which can be removed only by an awakening on the part of our citizens to the supreme value of health conservation, and to the need of employing trained, well-paid sanitarians to make Maine one of the most healthful as it is one of the most beautiful spots on earth.

Respectfully, yours,

E. W. GEHRING.

ROCKY MOUNTAIN SPOTTED FEVER.

A REPORT OF ITS INVESTIGATION AND OF MEASURES UNDERTAKEN FOR ITS ERADICATION DURING 1914.

By L. D. FRICKS, Surgeon, United States Public Health Service.

Upon the discovery of Rocky Mountain spotted fever as a distinct infectious disease of man, apparently limited to the Rocky Mountain region of the United States, the Public Health Service began the investigation of this disease because of its interest to medical science and more particularly on account of its possible importance as a public-health problem to the Western States, if not indeed to the entire North American Continent.

The investigation of Rocky Mountain spotted fever by the Public Health Service was begun in 1902, Surg. J. O. Cobb being ordered to investigate and report upon the disease as found in the Bitter Root Valley, Mont. (1). Anderson continued the field investigations for the service during the season of 1903 (2), Stiles during 1904 (3), Francis during 1905, King during 1906 (4), McClintic and Rucker during 1911 (5), McClintic again during 1912 (6), and Fricks during 1913 (7) and 1914.

In addition to these field investigations which were reported from time to time in the service publications, Anderson and Goldberger in 1909 investigated the relation of Rocky Mountain spotted fever to typhus fever (8), and Stiles in 1908 and 1910 named and described the wood tick *Dermacentor andersoni* (9) (10), which is responsible for the transmission of the disease to man.

The lines of investigation undertaken by the Public Health Service, therefore, comprise the clinical and epidemiological study of the disease begun in 1902; laboratory investigations conducted at the Hygienic Laboratory in Washington, and in field laboratories temporarily established in the Bitter Root Valley, begun in 1903; the entomological study of the wood tick *Dermacentor andersoni*, which is concerned in the transmission of the disease to man, begun in 1904; the eradication of Rocky Mountain spotted fever from the Bitter Root Valley begun in 1911 at the request of and in cooperation with the board of health of the State of Montana; and the determination of the areas of infection together with the questions of the extension and restriction of the disease throughout the Northwest begun in 1913 in cooperation with the health officials of the several Rocky Mountain and Pacific coast States.

Field Work, 1914.

In continuation of the field investigations and eradication of Rocky Mountain spotted fever, Surg. L. D. Fricks was again ordered to the Bitter Root Valley, arriving at Missoula, Mont., March 29, 1914. The representatives of the State of Montana at this time requested that the Public Health Service and the Bureau of Entomology continue the eradicative work in the territory as divided at the beginning of 1913 and that the Government during the current season bear all the expenses of eradication, the greater part of which had been borne by the State of Montana during 1913.

The State board of entomology agreed to promulgate additional regulations concerning the removal of domestic animals from infected territory during the tick season, and to secure if possible additional legislation through which the owners of domestic animals who fail to deliver them at the dipping vats after proper notification shall pay the cost of such delivery. It is expected that this will prove a more workable measure than the present law which provides for the imposition of fines and quarantine for disregard of the dipping regulations and which is applicable only in extreme cases.

The field work of the Public Health Service for the season of 1914 consisted of:

1. Laboratory investigations.
2. Measures employed for the control and eradication of Rocky Mountain spotted fever in the Bitter Root Valley, Mont.
3. Study of the distribution of Rocky Mountain spotted fever.

Laboratory Investigations.

The field laboratory at Victor, Mont., was reopened April 8, and investigations were conducted throughout the season, in so far as the more pressing work of eradication permitted. The investigations consisted primarily of a continuation of McClintic's work on ground squirrel immunity and experiments on the transmission of Rocky Mountain spotted fever in guinea pigs by biting insects other than the wood tick, *Dermacentor andersoni.* The latter experiments are being continued at the Hygienic Laboratory and upon completion will be made the subject of a separate report.

Control and Eradication of Rocky Mountain Spotted Fever in the Bitter Root Valley.

Undoubtedly the general acceptance of the fact that Rocky Mountain spotted fever can be transmitted by the bite of an infective wood tick has prevented the occurrence of some cases of the disease, but the number so prevented can not be determined. It has also given a certain sense of security to the people living on the west side of the valley, who, in place of the former vague uncertainty, now know that they have something tangible to guard against.

The inhabitants now generally avoid the woods and uncultivated lands of the infected territory during the tick season, or if this can not be done, protect themselves by proper clothing and occasional searching against tick bites; whereas, they used to boil their drinking water or refused to drink from running streams and paid no attention whatever to a dozen tick bites a day.

This general change in attitude has certainly exerted some control over the prevalence of the disease in the Bitter Root Valley and should not be lost sight of in our estimate of the efficiency of the different tick eradicative measures employed in the valley.

TICK ERADICATION.

All measures employed for the eradication of Rocky Mountain spotted fever from the Bitter Root Valley have been directed entirely toward the destruction of the wood tick, *Dermacentor andersoni.* These comprise:

(1) The reclamation and cultivation of arable land.
(2) The burning over of the foothills.
(3) The killing of wild animals.

(4) Hand picking and the dipping of domestic animals in arsenical dips.

(5) Sheep grazing.

The placing of new land under cultivation on the west side of the valley continues slowly, and, as a rule, by means of small isolated fields surrounded by open, uncultivated land. The full benefit from cultivation as a means of tick destruction is not obtained except in the case of large tracts, and the west-side foothills being too broken for extensive contiguous cultivation, it is not expected that this measure alone can greatly affect the problem of tick eradication in the valley.

The Forest Service continued in 1914 the systematic attempt to burn over the west-side foothills during the early spring months, while the mountain forests were still protected by snow, but without great success. Frequent rains prevented extensive burning until the snow had disappeared and the burning had then to be abandoned because of the danger to standing timber. Extensive burning each spring should reduce the tick infestation, but it seems very difficult of accomplishment under existing conditions in the Bitter Root Valley.

DESTRUCTION OF WILD ANIMALS.

The destruction of wild animals was begun by McClintic in the Victor district in 1911, and has been continued since that time by shooting, trapping, and poisoning.

During 1914 the carbon bisulphide pumps were used extensively for the destruction of ground squirrels (*Citellus columbianus*) in both the Victor and Hamilton districts, and arrangements were made with the farmers for the distribution of poisoned grain at the beginning of next season.

The destruction of small wild animals in the Victor district, in conjunction with other eradicative measures, appears to have resulted in a considerable decrease in the tick infestation found there.

DIPPING OF DOMESTIC ANIMALS.

At the beginning of the present season the Public Health Service had its full complement of dipping vats ready for operation. These vats are constructed of concrete, are three in number, and are placed from 8 to 10 miles apart in the southern half of the Bitter Root Valley, close up to the west-side foothills and, therefore, near the margin of the infected territory.

The Victor vat was erected in 1911 and has been operated by the service since that time, while the Hamilton and Gold Creek vats were erected in 1913, one by the State of Montana and the other by the Public Health Service.

The Victor vat was filled with arsenical solution on April 4, the Hamilton vat on April 8, and the Gold Creek vat on April 9, but the dipping of domestic animals was delayed by cold weather until April 15 and was continued for horses until June 15.

Frequent inspections were made of cattle previously dipped during the last weeks of May, and in certain localities no ticks were found attached to the dipped cattle after May 15. On regularly dipped horses, however, attached ticks were found until June 15.

The following summary of operations at the different vats is given:

Victor vat: Dipping was begun April 15, as soon as the cold weather permitted, and continued until June 16. All horses and cattle ranging on tick-infested territory in this district were dipped regularly at intervals of 10 days. The total number of domestic animals dipped was: Horses, 97; cattle, 417; goats, 21; sheep, 1,191.

The sheep were those used in the grazing experiments and were dipped after they had been sheared and just before they were returned to their owner.

Hamilton vat: Dipping was begun April 15 and continued until June 1, at intervals of from 10 days to 2 weeks. The total number of domestic animals dipped was: Horses, 7; cattle, 127; sheep, 500.

Gold Creek: Dipping was begun April 22 and continued until June 1, at intervals of two weeks. The total number of domestic animals dipped was: Horses, 8; cattle, 247.

Total for the three districts, including sheep, 2,615.

Some difficulty was experienced in the Gold Creek district in handling the range cattle, but this probably will not occur again.

The dipping season for domestic animals in the Bitter Root Valley begins as early in the spring as the weather will permit, generally the first or second week in April, and continues approximately six weeks for cattle and two months for horses. Cold weather frequently interferes with the dipping during April, so that it can not be carried on with proper regularity.

Observations conducted in the Victor district during the past four seasons have led to the conclusion that the dipping of domestic animals alone is insufficient for the eradication of Rocky Mountain spotted fever from the valley.

On the 8 square miles west of Victor and just north of Bear Creek, over which McClintic destroyed several thousand small animals in 1911 and 1912, and where they have since been kept in abeyance and the domestic animals regularly dipped, there has been a great reduction in the tick infestation; but immediately south across Bear Creek, where the domestic animals have also been regularly dipped since 1911 but no effort made to destroy the small animals, there is no appreciable diminution in the number of ticks found now as compared with the infestation at the beginning of the experiment.

SHEEP GRAZING AS A MEANS OF TICK ERADICATION.

The investigation of sheep grazing as a means of tick eradication in the Bitter Root Valley was begun by the Public Health Service in 1913 and reported by Fricks (11) at that time.

The four factors upon which the success of sheep grazing as a tick-eradicative measure depends were given as follows:

First. The removal of undergrowth and the consequent destruction of "good tick country" by close grazing.

Second. The destruction or removal from the sheep range of other large mammals, domestic and wild, which serve as hosts for the adult ticks.

Third. The destruction of the ticks themselves, principally by means of the lanolin in the wool of the grazing sheep.

Fourth. The placing of the problem of tick eradication on an economic basis, so that it may be carried out on an extensive scale without cost to the Government, the State, or the inhabitants of the valley.

It appears that the other measures of tick eradication employed in the valley—cultivation, burning, dipping, and killing of wild animals—have not been sufficiently extensive and either can not be made so, or, if possible, only at a very great expenditure of labor and money.

These objections can not be raised against sheep grazing, because once the industry is established on the west side of the valley it will run itself up to the limit of grazing capacity with at least a small profit to the sheep owners. The only question to be considered in regard to sheep grazing as a means of tick eradication is that of efficiency.

The experiments with sheep grazing during 1914 were conducted with two bands of dry sheep. One band of 1,000 sheep was obtained from Dr. G. T. McCullough, of Missoula; the other, numbering 500 sheep, was procured through Mr. L. E. Wolgemuth, of Hamilton.

Supervisor White, of the Bitter Root Forest Reserve, cooperated in the experiment, and through him permits were given for free grazing on the Bitter Root Forest Reserve.

Permits for free grazing were also secured from the property holders whose lands lay between the western border of the cultivated fields and the Bitter Root Forest Reserve. This strip of land, averaging about a mile in width and extending the length of the valley, constitutes the great danger zone of Rocky Mountain spotted-fever infection. With the wood tick eradicated from it the danger of infection will be accidental instead of constant.

The band of 1,000 dry sheep was grazed west of Victor, between Big Creek and Bear Creek Canyons. The herder's camp was changed at short intervals and the sheep were made to feed from the region of the cultivated fields west up into the Bitter Root Mountains and on to the Forest Reserve. The other band was similarly grazed west of the Hamilton vat, between Mill Creek and Blodgett Creek Canyons.

The experiment was begun April 15 and terminated July 15, when the sheep were sheared, dipped, and returned to the owners on the east side of the valley. During the experiment, sheep out of both bands were searched frequently for dead and live ticks, and from the findings it was estimated that 25,000 adult wood ticks were destroyed by the 1,500 sheep during the season.

Less than 500 adult ticks were killed by the regular dipping of all other domestic animals which ranged on this territory—about 14 square miles in extent—at the same time with the sheep, and the destruction of 50 times that number of ticks by two small bands of sheep is indeed encouraging, both when considered in comparison with the number destroyed by the other method of tick eradication employed and on the basis of the total tick infestation as previously estimated.

It is believed that this experiment shows conclusively that a high percentage of the total adult tick infestation can be destroyed by sheep grazing in one season, but as pointed out in an earlier report (11) it will be necessary to continue the experiment for three years in order to determine the full benefits to be derived from sheep grazing.

Live ticks, estimated at 10 per cent of the total number, were found attached to the sheep during the early examinations. If without too great interference with the handling of the sheep on the west side of the valley the progeny of these ticks can be prevented from reinfesting the valley, then we will have in sheep grazing a practical, rapid, efficient, and economical method of tick eradication in the Bitter Root Valley. It is believed that this can be done.

It appears that sheep grazing alone entirely eradicated the wood ticks from certain localities on the east side of the Bitter Root Valley. It is also well known that it has not done so after several years of grazing in other sections of the country, differing in topography from the Bitter Root.

Investigations were made during the past season through the sheep sections of Wyoming and Idaho with the purpose of determining, if possible, how this could be.

The following hypothesis, based on the grazing experiments conducted and the observations made during the past two years, is advanced and indicates the direction in which further researches in tick eradication will be carried on by the Public Health Service:

The most common type of so-called "sheep country" through Wyoming and Idaho consists of high plains, frequently broken by buttes or hills and cut by small canyons. It is poorly timbered, poorly watered, and covered usually with a sparse growth of sage brush. The rodent population—ground squirrels, prairie dogs, chipmunks, etc.—is generally distributed over the entire range, being most numerous where the food supply is most abundant, hence in places where the sheep will naturally tend to loiter.

The sheep are herded over this territory in large bands, consisting of 2,000 sheep, more or less, the herder shifting his camp about once a week, or as soon as the sheep have used up the feed in the vicinity of the old camp.

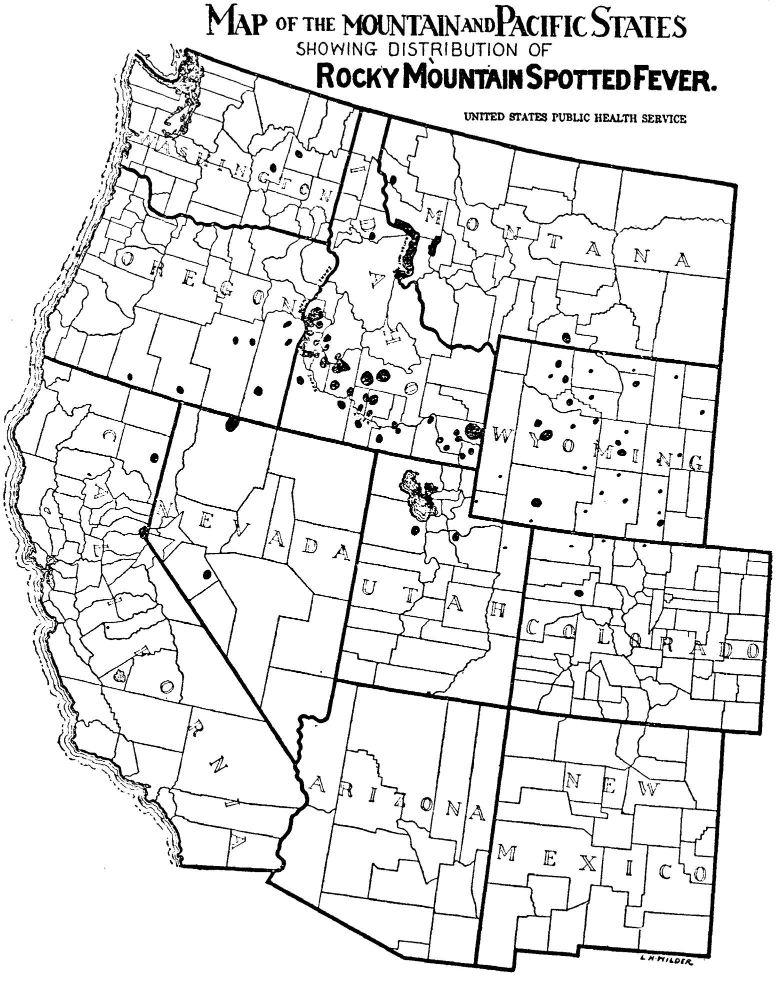
Under these conditions, even though the sheep should pick up and destroy 90 per cent of the wood ticks in any locality, as was shown they will do, in the Bitter Root Valley, there still would remain enough engorged ticks to continue the tick infestation, provided they were dropped where the larvæ when hatched could find suitable hosts for attachment, such as chipmunks, ground squirrels, etc. Owing to the general distribution of the small rodents in the average sage-brush country, this is easy of accomplishment.

Conditions are entirely different in the Bitter Root Valley. There we have a narrow valley flanked on almost every side by precipitous mountains reaching an elevation of 10,000 feet. The tick infestation, which we are trying to eradicate, and by far the greatest number of small rodents, are found in the foothills and along the lower reaches of the mountains. Higher up there are fewer ticks, except around the goat rocks, and fewer small animals to serve as hosts for the immature ticks.

A large band of sheep started in the foothills between two canyons and grazed closely for a week would pick up practically all of the ticks in that locality and destroy perhaps 90 per cent of them; then by shifting the sheep straight back into the mountains to the next camp site, located above the tick zone, the engorged ticks would be dropped where the larvæ on hatching would find few suitable hosts. The success of this method of tick eradication rests upon the removal back into the mountains of the sheep with the remaining attached ticks before they are fully engorged and ready to drop off for egg laying, a period which averages something over 10 days from time of attachment.

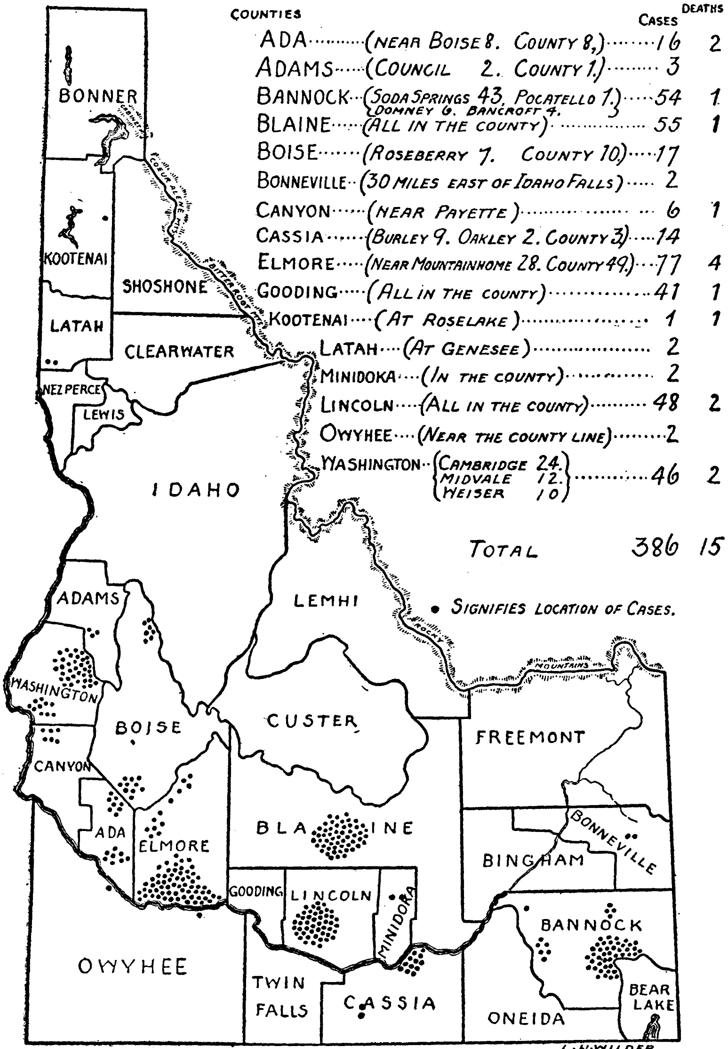
This appears to have been the exact process by which the ticks were unwittingly eradicated from parts of the east side of Bitter Root Valley several years ago.

Thirty to forty thousand sheep, in 20 or more bands, were driven out of the valley during each successive May to their summer range well back in the mountains. They were grazed slowly over the tick-infested foothills on the east side during the tick season, but always in the same direction—upward, onward, and into the mountains. In this way the camp sites were changed weekly and each new camp was located several miles above the last, and thus the ticks which were not killed were dropped where their progeny could find fewer hosts, and so they died. If this result was accomplished without supervision or even intent in one part of the valley, it certainly seems reasonable to expect that it can be accomplished under similar conditions in another part of the valley when the object to be attained is understood and judgment is employed in carrying it out.



The dots indicate areas of infection reported previous to 1915.

So far as is known, no observations have been conducted outside the Bitter Root Valley under conditions similar to those existing in the valley for the purpose of determining the value of sheep grazing as a means of tick eradication. It is a matter of common report, however, that ticks are generally less abundant on sheep ranges than on cattle and horse ranges, and the fact that grazing sheep do not destroy the ticks from a level or rolling sage-brush country has no bearing whatever on the problem of tick eradication as it confronts us in the Bitter Root Valley, Mont.



MAP OF IDAHO.—ROCKY MOUNTAIN SPOTTED FEVER,— YEAR 1914.
CASES COLLECTED BY STATE HEALTH OFFICER.

COUNTIES		CASES	DEATHS
ADA	(NEAR BOISE 8. COUNTY 8,)	16	2
ADAMS	(COUNCIL 2. COUNTY 1.)	3	
BANNOCK	(SODA SPRINGS 43. POCATELLO 1. DOMNEY 6. BANCROFT 4.)	54	1
BLAINE	(ALL IN THE COUNTY)	55	1
BOISE	(ROSEBERRY 7. COUNTY 10.)	17	
BONNEVILLE	(30 MILES EAST OF IDAHO FALLS)	2	
CANYON	(NEAR PAYETTE)	6	1
CASSIA	(BURLEY 9. OAKLEY 2. COUNTY 3.)	14	
ELMORE	(NEAR MOUNTAINHOME 28. COUNTY 49.)	77	4
GOODING	(ALL IN THE COUNTY)	41	1
KOOTENAI	(AT ROSELAKE)	1	1
LATAH	(AT GENESEE)	2	
MINIDOKA	(IN THE COUNTY)	2	
LINCOLN	(ALL IN THE COUNTY)	48	2
OWYHEE	(NEAR THE COUNTY LINE)	2	
WASHINGTON	(CAMBRIDGE 24. MIDVALE 12. WEISER 10)	46	2
TOTAL		386	15

● SIGNIFIES LOCATION OF CASES.

U.S. PUBLIC HEALTH SERVICE
L·H·WILDER.

Investigations of the Geographic Distribution of Rocky Mountain Spotted Fever.

The importance of locating the present areas of Rocky Mountain spotted-fever infection from a public health standpoint is obvious. Until this has been done it is impossible to determine when the disease has invaded new territory and whether the danger of its extension constitutes a menace to the entire Northwest.

The work of locating infected areas through the report of cases by attending physicians and health officials was continued during the season of 1914.

Reports were requested and received from the different health officers of the Rocky Mountain and Pacific Coast States in regard to the prevalence of Rocky Mountain spotted fever in their respective States. All cases reported in Montana during the season were investigated, and, in cooperation with the State health officer of Wyoming, an investigation was made of the past and present prevalence of the disease throughout that State. The information as obtained is given below briefly by States.

California.—No case of Rocky Mountain spotted fever has been reported to the State health officer since 1912. A very few cases had been reported for several years previous to 1912 from Lassen County, in the northeastern part of the State. This county is sparsely settled, and there is no reason for believing that the infection has spontaneously disappeared.

Colorado.—The extent of Rocky Mountain spotted-fever infection in this State is uncertain. No cases have been reported to the State health officer within the past three years, but cases had been reported formerly from Garfield County, and physicians in southern Wyoming report cases which had been infected across the State line in northern Colorado.

Dr. Arneill, of Denver, reports having treated three cases in past years and one in 1914. Further investigation will, without doubt, show that Rocky Mountain spotted fever is present in Colorado and probably that a few cases occur each year.

Idaho.—The State health officer of Idaho has collected complete records of the Rocky Mountain spotted-fever cases occurring throughout the State for several years past. His report for 1914 shows 386 cases, with 15 deaths.

This is a marked increase over the number reported for 1913, which was 239 cases, with 4 deaths.

Montana.—Twelve cases of Rocky Mountain spotted fever, with seven deaths, were reported during the year. Ten of these cases and all of the deaths occurred in the Bitter Root Valley. Two cases which recovered were reported from near Bridger, in Carbon County.

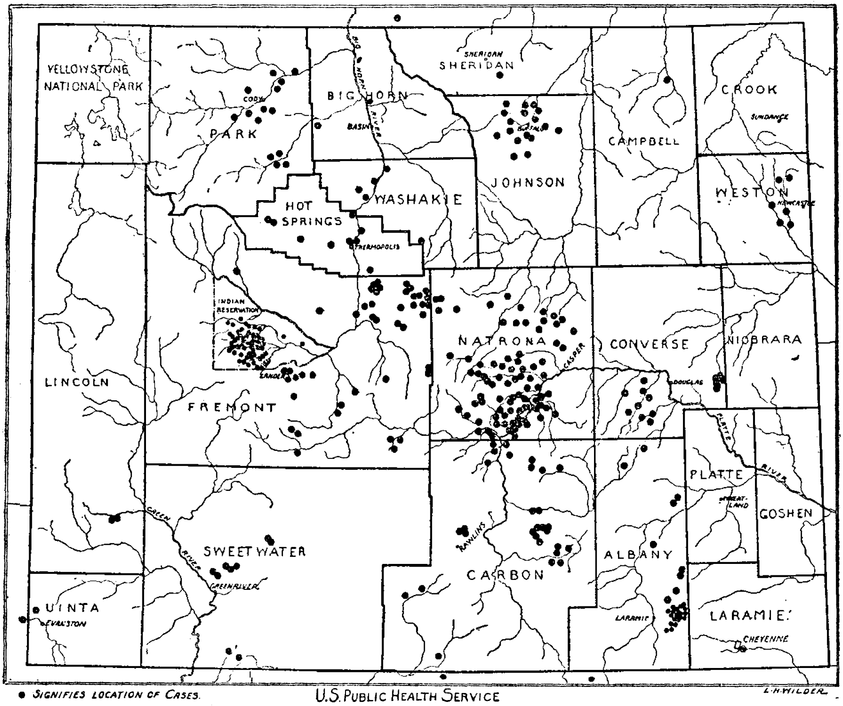
Nevada.—The State health officer of Nevada reports nine cases of Rocky Mountain spotted fever, all from Humboldt County, with no deaths. The majority of these cases came from Paradise Valley.

Oregon.—The State health officer of Oregon reports six cases of Rocky Mountain spotted fever, with three deaths, from Grant, Baker, and Crook Counties. This is a high mortality rate for the type of the disease found in Oregon, and it is therefore probable that other cases occurred which were not reported.

Utah.—The State health officer of Utah reports "that it is impossible to furnish any accurate data concerning the prevalence of Rocky Mountain spotted fever in Utah," but that several deaths were attributed to this cause during 1914, and there is reason to believe that the disease occurs in Box Elder County.

Rocky Mountain spotted fever certainly occurs in Utah, but to what extent is unknown, and will be until the disease is made reportable.

MAP OF WYOMING.
ROCKY MOUNTAIN SPOTTED FEVER CASES UPTO 1915.
AS COLLECTED FROM LOCAL PHYSICIANS.



Washington.—One case of Rocky Mountain spotted fever which recovered was reported by Dr. Lee Ganson, Odessa, Wash. This case was infected south of Sylvan Lake, Lincoln County. An investigation was made of this territory during 1913.

Wyoming.—During past years mention has several times been made in medical literature of cases of Rocky Mountain spotted fever occurring in Wyoming. Physicians in widely separated parts of the State have also reported cases attended by them from time to time, but no accurate record of the yearly incidence and distribution of the disease has been kept.

For these reasons an investigation was conducted at the request of and in cooperation with the State health officer. Physicians in different parts of the State were visited and information was obtained either from case records or from memory in regard to the number and location of cases of Rocky Mountain spotted fever attended by them.

The information obtained in this way, while probably not complete, is extremely valuable as a basis for future investigation of the distribution of Rocky Mountain spotted fever in Wyoming, since it shows conclusively that the disease has been recognized by the local physicians as coming from certain localities for the past 20 years at least. A brief summary of the information obtained from the different physicians is given below.

Dr. H. T. Harris, president state board of health, during 10 years in Wyoming, at Sheridan and Basin, treated six cases of Rocky Mountain spotted fever up to 1912, none since. Two of the cases were seen in Sheridan; one of these was believed to have come from the Crow Indian Reservation in southeastern Montana; all recovered.

Dr. W. O. Gray, during five years in Worland has treated six cases as follows: 1910—two in July, one from river bottom 17 miles north of Worland, one from outskirts of Worland; 1912—one case, particulars forgotten; 1913—one case in May from Gooseberry Creek, 15 miles southwest of Worland; 1914—two cases in June, one from Dickie Ranch, 30 miles west of Worland, one from Gooseberry Creek, 10 miles south of Worland; all recovered.

Dr. R. W. Hale during 24 years in Thermopolis has treated nine cases as follows: 1895—one case 34 miles up Grey Bull River; 1896—one case on Big Horn River near Manderson, 15 miles north of Thermopolis; 1901—one case on Big Horn River near Lucerne six miles north of Thermopolis; 1902—one case from 40 miles east of Thermopolis; 1907—one case from 50 miles south of Lander; 1908—two cases from camp site at Big Horn Hot Springs near Thermopolis; 1914—two cases; one from Big Horn Valley, a tramp; one from 27 miles west of Thermopolis; all these cases recovered.

Dr. N. D. Nelson during eight years in Wyoming, six at Shoshone and two at Thermopolis, has treated two cases as follows: 1905—one case at Atlantic City; 1907—one case from head of Beaver Creek, 60 miles south of Shoshone; both cases recovered.

Dr. A. S. Hamilton during six years in Thermopolis has treated three cases, all recovered; 1908—two cases from Cotton Wood Creek, 40 miles west of Thermopolis; 1913—one case.

Dr. Richards, now dead, was reported by other physicians in Thermopolis to have had three deaths from Rocky Mountain spotted fever, one in 1906 and two later from the Rattle Snake Mountain, 60 miles southeast of Thermopolis. One of these cases was an alcoholic.

Dr. E. L. Jewell during 10 years in Wyoming at Lost Cabin and Shoshone has treated 17 cases with two deaths, one in an alcoholic, the other aged 74 years; 1904 and1905—four cases; one from Bad Water Creek, one from Bridger Creek, two from Poison Creek; 1907—two cases from "Quien Sabe" ranch on Hoodoo Creek, 15 miles northeast of Shoshone; 1908—one case from "Quien Sabe" ranch; 1910—one case from Bridger Creek; 1912—two cases; one near Bonneville and one from Bonneville; 1913—four cases; one from head of Hoodoo Creek, one from Wind River, 4 miles west of Shoshone (died), one from Bridger Creek, one from Big Horn Mountains, 100 miles east of Shoshone. 1914—three cases; two from "Quien Sabe" ranch, one from 3 miles east of Riverton. All of these cases occurred in April and May except one in March and two in July.

Dr. A. B. Tonkin during nine years at Riverton and on Shoshone Indian Reservation, has treated seven cases with six recoveries and one death as follows: 1906—one case from Rattle Snake Mountains, 63 miles east of Riverton; 1911—one case from same locality; 1912—one case from Wind River Mountains, 40 miles west of Riverton, (half-breed Shoshone Indian); 1913—two cases from same locality (the first in a full-breed Shoshone Indian woman and the second in a half-breed who died); 1914—two cases; one from Black Mountain, 70 miles northwest of Riverton, one from 19 miles west of Riverton.

Dr. J. G. Cogswell, during six years in Riverton reports having treated nine cases, six in same family, as follows: 1911—one case from 30 miles southeast of Riverton; 1912—one case from Sage Creek, 30 miles southwest of Riverton on Shoshone Indian Reservation in an Indian woman 4 months pregnant, who died. Eruption profuse and purpuric in these cases; the others resembled measles and may have been that disease.

Dr. C. E. Lane during two years in Lander treated one case in 1914 from near Lander in an Italian farmer.

Dr. T. G. MaGhee came to Camp Brown, afterwards Fort Washakie, 16 miles west of Lander, as Army surgeon in 1873. Practiced in Rawlins from 1880 to 1906, and is now in charge of State institution for feeble-minded at Lander. Dr. MaGhee believes that he has treated or seen about 22 cases of Rocky Mountain spotted fever, the majority of these since 1906. First case was seen in 1876 or 1877 at Atlantic City, Wyo. Three cases at Rawlins, all in 1882, and one at Laramie about the same time.

Rev. Mr. Roberts, for 30 years Episcopal missionary to the Shoshone and Arapahoe Indians, states that he has seen probably from 50 to 75 cases of Rocky Mountain spotted fever, with several deaths. The majority of cases occurred from 1890 to 1900 among the Shoshone squaws, who went into the mountains wood chopping during early summer, a few cases among the whites at Fort Washakie, but does not recall any among the Arapahoes who live out of the foothills. According to Rev. Mr. Roberts, the Shoshones, unlike the Arapahoes, are very much afraid of spotted fever and have a superstition connecting the gopher with the disease.

Dr. A. H. Cooper, during 13 years in Wyoming—3 at Rock Springs and 10 at Lander—has treated 15 cases, with 14 recoveries and 1 death, as follows: 1902, 2 cases at Rock Springs; 1904, 2 cases at Lander; 1914, 2 cases at Lander. The other cases were scattered around Lander between 1904 and 1914—1 from near Thermopolis, 1 from 6 miles east of Lander, 1 from 10 miles south of Lander, and 2 from 35 miles southeast of Lander. One of these cases, seen with Dr. O. H. Wise at Fort Washakie, was in an Indian, George Washakie, aged 35, son of Chief Washakie, who was three-fourths Flathead and one-fourth Shoshone. George's mother was a full-blood Crow Indian. Thus George was without question a full-blood Indian who died from Rocky Mountain spotted fever. According to the agency record 2 Indians died from Rocky Mountain spotted fever in 1914.

Dr. T. A. Dean, during 19 years in Wyoming around Casper, has treated at least 12 cases. First case seen in 1896, others scattered along from year to year. None came from east of Casper and the majority of them were from around Lost Cabin, 75 miles northwest of Casper, at the foot of the Big Horn Mountains. All recovered.

Dr. J. F. Leeper, during 9 years in Casper, from 1893 to 1900 and from 1912 to 1914, has treated 20 cases at least in and around Casper, with 1 death in 1897, in a male aged 54 years. Also treated several cases at Chesne, Utah, while on duty there with the United States Army. In 1913, 3 cases; 1914, 1 case—all from Powder River north and northwest of Casper. Dr. Leeper believes that the disease is not so prevalent now as in former years. The worst period was from 1894 to 1897, during which time he treated at least 12 cases and knew of probably 50 others around Casper. Dr. Leeper recalls 4 deaths from Rocky Mountain spotted fever around Casper during the past 20 years.

Dr. H. R. Lathrop, during 9 years in Casper, has treated from 40 to 50 cases of Rocky Mountain spotted fever, fewer this year than usual. All recovered. The majority of the cases came from the vicinity of Pathfinder, Alcova, and Bates Creek, 25 to 40 miles west and southwest of Casper.

Dr. C. L. Gillam, during 18 years in Wyoming—10 years at Cody and 8 at Casper—has treated about 25 cases of Rocky Mountain spotted fever, equally distributed around Cody and Casper. The first case was seen accidentally at Cody's first Fourth of July celebration, about 1898. Six years later Dr. Gillam and Dr. Carter were requested by the State health officer to investigate 6 cases at Cody and 3 at Meeteetse suspected of being smallpox. All of these were found to be Rocky Mountain spotted fever.

Dr. M. C. Keith, during 8 years in Casper, has treated from 8 to 10 cases of Rocky Mountain spotted fever, with 1 death, 1908, in patient over 60.

Dr. J. R. Hylton during eight years in Douglas has treated 12 cases with no deaths and knows of only one death from Rocky Mountain spotted fever around Douglas in the past eight years. Treated two cases from Shoshone in 1913, but none around Douglas in recent years.

Dr. A. H. Cantril, during five years in Cache Valley, Utah, 1903 to 1908, treated between 30 and 35 cases, all recovered. During six years at Douglas, 1908 to 1914, he has treated five cases, but none since 1911. The Douglas cases came from around Lost Spring, 32 miles east of Douglas. All recovered.

Dr. Paul W. Newcommer, Gillette, Wyo., reports to the State health officer a clear case of Rocky Mountain spotted fever seen by him April 27, 1913, from Little Powder River, 40 miles north of Gillette. Recovered.

Dr. Fred Horton, Newcastle, Wyo., reported no cases in 1913, but a few in previous years. All recovered.

Dr. J. W. Blake, Buffalo, Wyo., reported one case in 1913, 2 miles from Sheridan.

Dr. F. W. Phifer, Wheatland, Wyo., reported two cases in 1913 from mountains of Albany County, west of Wheatland.

Dr. A. W. Barber, Cheyenne, United States Army surgeon at Fort Fetterman from 1885 to 1890. During that time treated an average of three cases each summer from country around Buffalo, and has treated one case at Cheyenne in 1913 from the Laramie Mountains northwest of Cheyenne. All recovered.

Dr. O. K. Snyder, during 12 years in Cheyenne, has treated two cases, one in 1910 and one in 1911. Both cases came from vicinity of Granite Springs Reservoir, 25 miles northwest of Cheyenne. Both recovered.

Dr. A. B. Hamilton, Laramie, Wyo., during 21 years in Albany County, has treated eight cases as follows: 1911—five cases, four from Lodge Pole Creek, 15 miles east of Laramie, and one from Marshall, on Cottonwood Creek, 85 miles north of Laramie; 1912—two cases, one from Elk Mountain, 56 miles northwest of Laramie, one from Hanna, on Southern Pacific Railroad; 1913—one case from 45 miles north of Laramie. All recovered.

Dr. J. P. Markley, during two years in Laramie, has treated two cases, both in 1913, one from North Park, Colo., 75 miles southwest of Laramie, and one from Plumbago Canyon, 35 miles northwest of Laramie. Both recovered.

Dr. W. H. Fickel, during three years in Medicine Bow, has treated two cases, both in 1914. One from 50 miles northeast of Medicine Bow, one from 14 miles southwest of Medicine Bow. One died and one recovered.

Dr. T. J. Swisher, county health officer, during 11 years in Rawlins has treated five cases, all of which recovered: 1907—one case from 30 miles southwest of Rawlins; 1908—two cases, one from 50 miles northeast of Rawlins; 1911—one case from 40 miles southwest of Rawlins; 1912—one from 70 miles northwest of Rawlins. Dr. Swisher stated that he has known of three deaths from Rocky Mountain spotted fever in Carbon County, Wyo., in the past 11 years.

Dr. Raymond Barber, during nine years in Rawlins, has treated at least five cases of Rocky Mountain spotted fever, as follows: 1906—one case from 60 miles south of Rawlins, in Colorado; 1908—two cases from Green Mountains, 45 miles north of Rawlins; 1914—two cases from Elk Mountain, one of which died. The other case recovered.

Dr. J. C. Hammond, Omaha, Nebr., reports by letter having treated 14 cases of Rocky Mountain spotted fever, while in practice at Hanna, Wyo., from 1902 to 1906, with one death, as follows: 1902—four cases, all from Hanna, in children from 6 to 12 years old; 1903—four cases, three children, and one woman of 50 who died; 1904—two cases, one from Hanna and one from Medicine Bow River, 30 miles south of Hanna; 1906—four cases, one from Shirley Basin, 45 miles north of Hanna, one from Walkins Ranch on Medicine Bow River, 20 miles north of Hanna, one from Lone Nine Ranch, 25 miles north of Hanna, one from Hanna.

Dr. J. H. Young, during 15 years in Rock Springs has treated five cases, all recovered: 1905—two cases from near Kemmerer; 1909—one case from 40 miles south of Rock Springs; 1910—one case from Hanna; 1911—one case from Hanna.

Dr. Oliver Chambers, during 11 years in Rock Springs has treated one case, this in 1914, from 50 miles south of Rock Springs. Recovered.

Dr. C. M. Freeman, during 16 years in Rock Springs, has treated one case, this in 1906, from Six Mile Springs, 6 miles northwest of Rock Springs. Recovered.

Dr. G. E. McDonald, during seven years in Superior, has treated two cases, both during 1914 and both from Natural Corral, 6 miles northeast of Superior. Both recovered.

Dr. J. W. Hawk, during 18 years in Green River, reports having treated three cases, all in 1909. Two cases from Green River in man and wife (wife taken sick eight days after husband, who died). One case from Bryan, 15 miles west of Green River.

Dr. H. P. Brandenburg, Green River, during three years in Lander, treated one case in 1913, from Sweetwater River. Recovered.

Dr. George E. Bristol, during 16 years in Evanston, has removed many ticks and treated many tick bites, but has never seen a case of Rocky Mountain spotted fever.

Dr. J. L. Wicks, during 16 years in Evanston, has treated one case of Rocky Mountain spotted fever, about 1906. Patient came from Utah within a month before he was taken sick and lived 10 miles north of Evanston.

Dr. F. H. Harrison practiced from 1867 to 1871 at Atlantic City, Wyo., and since that time in Evanston. Has heard of no case of Rocky Mountain spotted fever in Bear Lake region. In 1910 treated a suspicious case in girl living on railroad work car, who had a chronic purulent discharge from the middle ear and a general eruption. The girl died and the case is doubtful.

Dr. A. P. Thompson, during four years in Evanston, has seen no case of Rocky Mountain spotted fever, but had two deaths due to infection following tick bites, one in 1910 and one in 1913. According to the histories given neither of these cases could have been Rocky Mountain spotted fever, but both were reported as such in the newspapers.

Dr. C. H. Soiler, during 22 years in Evanston, has treated two cases, both in 1907, one case 15 miles east of Evanston. Both recovered.

Dr. Gamble, Kemmerer, has practiced at Diamondville and Kemmerer for past 20 years; treated one case of Rocky Mountain spotted fever in 1904 from Almy. Case first thought to be smallpox. Recovered.

Dr. W. A. Whitlock, during five years in Layton, Davis County, Utah, treated three cases of Rocky Mountain spotted fever. All recovered. In three years' practice at Kemmerer has not seen a case.

The above reports from local physicians throughout Wyoming, collected almost entirely by personal interrogation, show approximately 372 cases of Rocky Mountain spotted fever, with 29 deaths, which have been recognized and treated by them up to and including 1914. Twenty-six cases and four deaths occurred during 1914.

It is impossible to determine what percentage of the total cases which have occurred in the State these figures represent. Under the conditions which existed during the early settlement of Wyoming and even up to very recent years many cases must have gone on to recovery or death without the care of an attending physician. It is also conceded that a very few of the cases here reported as Rocky Mountain spotted fever may have been smallpox, measles, or scarlet fever, but with every physician visited the histories of all cases reported were carefully reviewed.

These reports show that Rocky Mountain spotted fever has been present in Wyoming for many years, and that the majority of the cases have come from Fremont, Natrona, Carbon, and Albany Counties. A few cases were reported from Park County around Cody and Meeteetse. Scattered cases were also reported from Big Horn, Washakie, and Hot Springs Counties along the Big Horn River and its tributaries. The disease is not uncommon in Johnson County around Buffalo, and a few cases were reported from Weston County very close to the South Dakota line.

It is believed that a careful study of the disease continued over several years will show that there exist definite areas of infection within the State, conforming closely to the location of the cases collected in this report. When the physicians of Wyoming regularly report their cases of Rocky Mountain spotted fever other areas of infection will probably be found and only after all of these have been discovered will we be in a position to determine whether the disease is spreading within the State.

Bibliography.

1. Cobb, J. O.: The so-called spotted fever of the Rocky Mountains. A new disease in the Bitter Root Valley, Mont. Pub. Health Rep., Wash., v. 17, No. 33, pp. 1868–1870, 1902.

2. Anderson, J. F.: Spotted fever (tick fever) of the Rocky Mountains, a new disease. Hyg. Lab., Wash., Bull. No. 14, 1903.

3. Stiles, C. W.: A zoological investigation into the cause, transmission, and source of Rocky Mountain spotted fever. Hyg. Lab., Wash., Bull. No. 20, 1905.

4. King, W. W.: Experimental transmission of Rocky Mountain spotted fever by means of the tick. Preliminary note. Pub. Health Rep., Wash., v. 21, No. 30, pp. 863–864, 1906.

5. McClintic, T. B.: Investigations of the tick eradication in Rocky Mountain spotted fever. Pub. Health Rep., Wash., v. 27, No. 20, pp. 732–760, 1912.

6. McClintic, T. B.: Rocky Mountain spotted fever. Some investigations made during 1912. Pub. Health Rep., Wash., v. 29, No. 17, pp. 1008–1020, 1914.

7. Fricks, L. D.: Rocky Mountain spotted fever. A report of its investigation and of work in tick eradication for its control during 1913. Pub. Health Rep., Wash., v. 29, No. 8, pp. 449–461, 1914.

8. Anderson, J. F., and Goldberger, J.: On the relation of Rocky Mountain spotted fever to the typhus fever of Mexico. Pub. Health Rep., Wash., v. 24, No. 50, pp. 1861–1862, 1909.

9. Stiles, C. W.: The common tick (*Dermacentor andersoni*) of the Bitter Root Valley. Pub. Health Rep., Wash., v. 23, No. 27, p. 949, 1908.

10. Stiles, C. W.: The taxonomic value of the microscopic structure of the stigmal plates in the tick genus Dermacentor. Hyg. Lab., Wash., Bull. 62, 1910.

11. Fricks, L. D.: Rocky Mountain spotted fever. Sheep grazing as a possible means of controlling the wood tick (*Dermacentor andersoni*) in the Bitter Root Valley. Pub. Health Rep., Wash., v. 28, No. 32, pp. 1647–1653, 1913.

PLAGUE-ERADICATIVE WORK.

CALIFORNIA.

The following reports of plague-eradicative work in California were received from Passed Asst. Surg. Hurley, of the United States Public Health Service, in temporary charge of the work:

Week Ended Dec. 19, 1914.

San Francisco.

RAT PROOFING.

Inspections of new buildings under construction	239
Basements concreted, new buildings (63,519 square feet)	45
Floors concreted, new buildings (329,790 square feet)	25
Yards, passageways, etc., new buildings (83,738 square feet)	56
Total area of concrete laid, new premises (square feet)	477,047
Inspections class A, B, and C (fireproof) buildings	245
Roof and basement ventilators, etc., class A, B, and C, buildings screened	775
Wire screening used (square feet)	4,030
Openings around pipes, etc., closed with cement	2,229
Sidewalk lens lights replaced	6,000
Inspections, old buildings	271
Wooden floors removed, old buildings	38
Yards and passageways, planking removed	14

RAT PROOFING—continued.

Cubic feet new foundation walls installed, old buildings	6,812
Concrete floors installed, old buildings (21,112 square feet)	29
Basements concreted, old buildings (6,885 square feet)	15
Yards and passageways, etc., concreted (26,466 square feet)	95
Total area concrete laid in old premises (square feet)	54,463
Floors, old buildings, rat proofed with wire cloth (6,070 square feet)	10
Buildings razed	24
New garbage cans stamped approved	575
Nuisances abated	280

OPERATIONS ON THE WATER FRONT.

Vessels inspected for rat guards	18
Reinspections made on vessels	20
New rat guards procured	12
Defective rat guards repaired	16
Vessels on which cargo was inspected	1

	Condition.	Rat evidence.
Steamer President, from Seattle:		
25 boxes seeds	O. K.	None.
50 bundles rags	O. K.	None.
20 cases household goods	O. K.	None.
250 sacks flour	O. K.	None.